SURGICAL RELATIONS

OF THE ILEO-CÆCAL REGION.

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SURGICAL RELATIONS OF THE ILEO-CÆCAL REGION.[1]

In considering the functions of the different portions of the alimentary tube, and their liability to derangements, none seems of more importance than the ileo-cæcal division of the small and the large intestines. Apart from the intimate connections of the duodenum with neighboring organs, there is no part of this highly vitalized conduit, from the stomach to the rectum, whose physiological operation is so essential to health and whose pathological conditions are so hurtful, as this valvular mechanism. A complete separation of the nutritious and excrementitious processes is effected by this somewhat complicated apparatus; and an entire transformation in the contents of the alimentary canal ensues after passing through this peculiar connection of the small and large intestines.

A brief outline of the relations of these organs, given by Weisse and by Ziegler, may prove satisfactory for a proper comprehension of the various affections, involving the ileo-cæcal connections, which require surgical treatment. The cæcum, lodged in the superior part of the right iliac fossa, and completely invested by peritoneum, is inferior to the ileo-colic opening—the latter at the junction of the cæcum and colon. From the cæcum is appended a blind tube, the appendix vermiformis, which curls inferiorly and is suspended by a special meso. The ascending colon for its first half is fixed to the interior of the right posterior wall of the flank by the ascending meso-colon (Weisse's Anatomy, p. 61). Upon the surface of the cæcum, its longitudinal muscular fibres are so collected as to form three bands, one anterior,

one postero-external, and one postero-internal; it is these bands that determine its sacculated character. These longitudinal bands are presented in the course of the lower portion of the colon from the bundling of the longitudinal muscular fibres, with the peculiar sacculæ of this gut interposed; having the appendices epiploicæ at the clefts between them. The inner mucous membrane is raised into transverse prominences between the three longitudinal furrows.

The superior branch of the ileo-colic artery distributes to the commencement of the ascending colon, the inferior distributes to the cæcum, and the terminal portion of the ileum, and anastomoses with the trunk of the superior mesenteric artery. The inferior portion of the ileum is covered by peritoneum, and at the line where the two layers meet upon its circumference its arteries and nerves enter and its veins and lymphatics leave it. The valvulæ conniventes furrowed by the reduplication of the mucous membrane in the other parts of the small intestine, are absent in that portion of the ileum adjoining the valvular connection with the large intestine. The ileo-colic valve is formed by two reduplications of the mucous membrane of the colon, which effects a button-hole slit of communication, that only admits of the passage of solids or fluids from the small into the large intestines. This may be demonstrated by filling the ileum with water, and allowing it to pass through the valve into the colon, when reversing the current it will be arrested effectually by the valvular folds. The canal of the vermiform appendix opens into the cæcum, passing through its wall obliquely, thereby forming a valvular opening. Its mucous lining membrane differs from that of the cæcum (Weisse's Anatomy).

Colitis is sometimes caused by the arrest of fæcal matter in the ascending colon and the formation of hard masses; it is also due at times to septic infection, and again to a specific poison, as in dysentery.

We learn from Ziegler's "Pathological Anatomy," that catarrh ending in atrophy is commonest in the large intestine, and especially in the cæcum. Nothnagel found that in 80 per cent. of the adults he examined there were traces of atrophy in the large intestine, at times confined entirely to the cæcum. The ascending colon came next as regards frequency, and then in diminishing order, the upper part of the ileum and the jejunum. The muscular coat is usually unaffected, but here and there it may be atrophied. It is not very liable to degeneration, but sometimes, as in phthisis, it is found to be fatty. Lastly, there is a congenital form of atrophy, a hyperplasia of the muscularis, which is not made up in after life. In chronic catarrh atrophy is occasionally associated with the development of hyperplastic growths. They take the form of hyperplastic indurations of the submucosa or polypous excrescences arising from the mucosa. When fully developed these last consist of fibrous tissue enclosing a few remains of glandular structures, which here and there are degenerated into closed cysts.[1]

Inflammation of the ileum is often marked by the swelling and prominence of the solitary and agminated follicles. The former appear as reddish or grayish protuberant nodules; the agminated follicles as flat elevations, grayish, red or pink in color, and pitted with numerous little depressions. When these follicles break down they leave behind them follicular ulcers.[2]

The vermiform appendage is peculiarly adapted to catch and retain substances passing shrough the cæcum. Matters which have been swallowed—such as grape seeds, apple-pips, cherry-stones, and the like—and fæces, may accumulate in the appendage and set up inflammation. Sometimes these become encrusted with phosphates and carbonates, and so

[1] Ziegler, Text-book of Pathological Anatomy, p. 281.
[2] Ibid., p. 282.

form fæcal concretions or calculi. The inflammation thus set up may extend to all the coats of the appendages and then attack the contiguous structures; and in this way necrosis and gangrene, with perforation, may be caused. The issue differs in different cases. It is comparatively favorable if the inflammation continues to be circumscribed, while the exudation is moderate in amount; protective adhesions and false membranes may thus be formed about the affected spot. It is very unfavorable when perforation takes place before adequate adhesions are formed; fatal peritonitis is nearly always induced. When perforation takes place into a part of the peritoneum shut off by adhesions a burrowing fæcal abscess is produced, which may burst internally or externally. Sometimes the appendage is entirely obliterated by adhesive inflammation; but if the inner or intestinal end becomes closed while the remainder continues to be patent, the natural mucous secretion may collect into the latter and distend it into a cyst.

Typhlitis and perityphlitis are sometimes due to the extension by continuity of inflammation already existing in more distant parts of the cæcum or colon. Tuberculous and typhoid ulceration localized in the vermiform appendages may give rise to dangerous lesions.[3]

As autopsic observations afford us an insight to the pathology of cases otherwise obscure, it may prove satisfactory to present an abstract of two cases from the report of Dr. W. T. Bull, in the *New York Medical Record*, touching suppurative peritonitis: A laborer, aged 25, with pulse 120, respiration 30, temperature 103°, with considerable general tympanitis and great pains, referred particularly to the right side and iliac fossa and radiating down the side, had a chill, followed by high fever and vomiting. He

[3] Ibid., p. 282.

was constipated, but the bowels had moved once after an enema. The needle detected pus only in the lumbar region, where there was no tenderness. An incision was made down to the very wall of the colon, and but a drachm of offensive pus was found behind the colon. The symptoms of general peritonitis persisted, and he died in two days. The autopsy disclosed a general suppurative peritonitis, perforation of the appendix in two places near the cæcum, and fæces in the connective tissue of the iliac fossa, which was softened and necrotic as far up as the liver, but not yet broken down so as to form much pus, and *nowhere communicating with the peritoneal cavity.* In a like case of Dr. R. Wiener there was found general peritonitis and an abscess behind the cæcum and ascending colon, which contained a pint or two of fluid fæcal matter

A peculiarly instructive case of traumatic origin is reported in the *Medical Press*, of London, for March 31st, 1886, by Mr. W. A. Meredith, of a feeble woman aged 58 years, who was operated on at the Samaritan Free Hospital in April, 1885, for double ovarian cystoma, complicated by very extensive adhesions. At the end of a week, the bowels having acted and the pulse being normal, the stitches were removed and the abdominal incision was found well united. On the evening of the same day the patient suddenly complained of nausea and soon after vomited a quantity of dark-green fluid. The examination revealed some dulness over the region of the cæcum and the condition was diagnosticated as commencing intestinal obstruction. On the following morning an operation was undertaken, and on opening the abdomen the peritoneum was found intensely red and conjested, evidently in an early stage of acute inflammation. Attention was attracted to a coil of greatly distended small intestine, which was badly kinked and obstructed in consequence of the traction exerted upon it by a portion of the ligated omentum, which was closely

adherent to its surface. This having been released with some difficulty, owing to the inflamed and softened state of the bowel, another distended coil, similarly obstructed by a separate omental band, was also set free. No further obstruction being discoverable, the abdomen was then closed. The acute symptoms were at once relieved by the operation, and the temperature fell to normal again on the third day, but convalescence was tedious. The bowels were evacuated for the first time on the twenty-third day by enema, and thenceforth they acted daily. The patient left the hospital on May 16th, exactly six weeks from the date of her first operation, and when last heard from in the end of October she had quite recovered her health.

The favorable issue of this operation on the eighth day after a previous laparotomy, from which inflammation had ensued, presents a crucial test of the efficacy of operative interference in abdominal troubles complicated with peritonitis; and is corroborated by other successful laparotomies after inflammatory development. This confirms my remark[4] when treating of Duodeno-cholecystostomy, as follows: It is an interesting fact that in some conditions of traumatic origin secondary operations are attended with less risk to life than those undertaken soon after the receipt of injury; and we are led to infer that the reaction or tolerance of the organization in its abnormal state may be favorable to the result of surgical procedures in the human system after the disorders connected with biliary obstruction have diminished the tendency to active or acute inflammation in the organism. A problem of serious import for the surgeon is, however, sometimes presented as to the extent of impairment in the vital energies that is compatible with recovery from an operation; and we must not delay surgical relief until the capacities of

[4] On page 240 of the "Reference Handbook of the Medical Sciences," Vol. ii.

the physical constitution are exhausted; yet, the tendency to destructive inflammation must be lessened by this adynamic element, so as to impart a tolerance of surgical interference.

A case reported by Dr. Charles A. Leale, in *Gaillard's Journal* for April, 1886, illustrates an interesting phase of injury to the intestines, from a gun-shot wound. In this instance at least two portions of the bowels were perforated, one below the cæcum, in the ascending colon, and the other in the small intestines, each of which subsequently was the seat of an artificial anus, through which all the discharges took place from March 25, 1865, the day the wound was received, until April 27, when, to relieve a desire to empty the rectum, an enema of soap and water was given *per anus* with the desired effect of reëstablishing the patency of the entire length of the intestinal canal. After using the opium and stimulant treatment for thirty-one days, several sloughs of tissue and omentum were removed. Diet of beef extract and light nutritious food brought about steady improvement, and the doses of opium were gradually diminished until the seventy-ninth day. At this time the openings were thoroughly irrigated with sol. sodæ chlor., dil., the surrounding tissue down to the intestinal canal was denuded so as to represent an incised circular wound; the walls were approximated and the parts were hermetically sealed externally. In ten days the dressings were removed, showing complete success in the closure of the anterior wound, but failure of the operation as to the posterior, from the presence of a cherry-seed in the aperture, which had been swallowed while eating the fruit surreptitiously. Two weeks subsequently another operation obliterated the posterior fæcal fistula, after which the fæcal matter passed alone by the anus.

On the 30th of July, 1885, over twenty years after operating in this case, a letter was received stating that the patient "enjoyed pretty good health,"

and it is inferred that it was a complete success.

The fact of passing over a month subsequent to the injury without a rectal evacuation, and having intestinal communication restored by such simple means, corroborates the evidence afforded by discharges from both apertures, that no arrest occurred at the intervening ileo-cæcal connections, and substantiates the recuperative powers of nature.

The ileo-cæcal connections become involved in disease of an acute or chronic form, and the pathological condition may be of a benign or malignant nature. That abnormal relation of the parts connected with invagination of the ileum, by its passage through the valvular opening into the cæcum or colon, is, at the outset, simply a mechanical displacement, but very soon induces modifications of the nerve elements and in the sanguineous circulation, accompanied by an inflammatory state of the tissues. There may exist a considerable constriction by spasm of the muscular components of the ileo-cæcal valve causing all the symptoms of obstruction, with the development of inflammation only as a secondary modification, and we are warranted by the speedy fatal termination of some cases, with indications of collapse, in attributing the result to an operation through the nervous system similating shock. I had an opportunity of making a post-mortem of a case which was diagnosticated as intussusception in my private infirmary during my residence in Brazil, that died on the third day; and there were really no indications of inflammation in the tissues. A very remarkable feature of this invagination of fourteen inches of the ileum within the colon was such a constriction remaining at the valve four hours after death, when the autopsy was made, that no traction short of a rupture of the gut was sufficient to withdraw it. But upon insinuating a probe-pointed bistoury and nicking the edge of the valvular fold, the bowel was readily drawn out, being in such a state of preservation that

there could have been no liability to disorganization of its structure had laparotomy, with release of the constriction, been resorted to some hours before the collapse ensued. This case is unique in that a spasmodic constriction continued after death.

In another case of death on the third day, to which allusion is made in my article on "Obscure Impediments of the Intestinal Canal," in the November number of *Gaillard's Journal*, 1885, all the symptoms warranted the diagnosis of intussusception, and yet under the influence of chloroform there was no tumor found, or other evidence of local inflammation in any part of the abdomen.

The case of invagination through the ileo-cæcal valve in which laparotomy was performed on the fourth day, by Dr. J. C. Irish, of Lowell, Mass., only exhibited some congestion of the ileum for a few inches above the obstruction, and the remainder of the intestinal canal was free from any inflammatory action.[5]

It is evident, therefore, that inflammation is not set up generally within the first twenty-four hours after the symptoms of invagination indicate the nature of the case, so that the course inculcated by Mr. Frederick Treves, in the *British Medical Journal*, of August 29, 1885, as to the performance of laparotomy within this period is based upon correct pathological principles.

The great surgical desideratum in regard to this class of cases is a proper basis for forming a correct diagnosis, and a question of paramount importance is the propriety of resorting to an exploratory incision for the purpose of verifying the presumptive evidence afforded by symptoms of invagination. Simple incision of the coats of the ileum near the valve on account of arrested biliary calculi, and of the walls of cæcum for fæcal concretions or other

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[5] Boston Medical and Surgical Journal, Sept. 3, 1885.

solid bodies lodged in this depository, are required at times, all of which necessitate the preliminary measures of laparotomy.

In cases of doubtful diagnosis, presenting reasonable grounds for the conviction that there exists a disorder calling for operative interference, exploratory laparotomy should be resorted to at an early stage after other modes of treatment have failed to afford relief; and the consequences of thus opening the abdominal cavity where operations upon the contained organs are not undertaken, are not generally serious.

With a view to afford temporary relief for ileo-cæcal disorders, enterotomy is recognized as a legitimate recourse in surgery; and some eminent surgeons have even recommended this procedure for forming an artificial anus, where the nature of the trouble was not apparent after exploratory laparotomy, yet it should be avoided whenever other means of relief are available.

"Typhlitis, strictly speaking, is limited to affections of the cæcum and its appendix vermiformis; perityphlitis is mostly due to extension of the inflammation to their peritoneal envelope; while the term paratyphlitis," according to Whittaker, "signifies an involvement of the extra-peritoneal and post-cæcal connective tissues," and may perhaps appropriately include all the inflammatory developments in the ileo-cæcal region. But the inquiry proposed extends to disorders of this division of the intestinal canal and its surroundings, which may occur without inflammatory action in the tissues, and hence not included in the above classification. I have therefore adopted the comprehensive phraseology which heads this paper, as a general expression, embodying the various derangements of the ileo-cæcal connections that call for surgical interference.

The modifications of structure from acute and chronic disease of an idiopathic nature, as well as

those changes which are induced by obstructions of various kinds from within or without the intestinal canal, on either side of the valve of Bauhin, with the disturbance of function from volvulus and intussusception in this region, are the objects of our present investigation.

The degeneration of the normal constituents may result in fibrinous indurations or in malignant tumors, involving the walls of the cæcum and the vermiform appendix, as well as the adjacent structures, so as to interfere materially with their functions, and ultimately obliterate the lumen of the intestinal canal. On the other hand, suppurative action may ensue, burrowing in various directions, until a discharge takes place by ulcerations through the bladder, the colon, or into the peritoneal cavity, inducing peritonitis, with all its grave consequences.

There are sometimes complications growing out of the implication of adjacent tissues which do not enter into the ileo-cæcal connections, from their temporary or partial engagement in the internal opening of the inguinal canal or in the aperture of the femoral tract. The strangulation, though relieved, may set up a train of disorders which extends itself to the neighboring organs by contact or by transmission of the inflammation through the common serous investment. Cellulitis may likewise ensue from septic influences, more especially in females, and involves the structures proper of the ileo-cæcal region. Thus it turns out that this special division of the intestinal canal is amenable to morbid impressions from various sources, independent of the immediate origin of trouble in its own tissues.

A portion of the ileo-cæcal connections being covered by peritoneum, while another portion is attached by connective tissue to the wall in the lumbar region outside of the duplicature of this serous lining of the abdomen, the pathological conditions of the different segments are correspondingly modified by the in-

flammatory processes affecting the various components of this complex organization. The mucous and serous membranes, the fibrinous and muscular elements, the cellular and connective tissues, show diverse effects. We learn from a concise paper of Mr. J. Bland Sutton, in the London *Lancet*, that inflammation is "*the method by which an organism attempts to render inert noxious elements introduced from without or arising within it;*" and that "the most important feature in the inflammatory process is the vascular disturbance."

The facts and observations adduced present the whole process of inflammation in an entirely new aspect, and instead of being a purely pathological process, it will rank as one of normal physiology, which when in excess comes within the domain of pathology.

Inflammation may be of two kinds, according to the nature of the irritant. It may be simple or specific. Simple inflammation is the reaction which follows mechanical, thermal or chemical stimuli or irritations. A specific inflammation is one which results from the introduction into the organism of a particular poison or irritant. The mode by which a piece of noxious tissue is encapsulated or cast out of the body illustrates the process by which bacteria, etc., are in some cases rendered inert by the activity of cells. If the invasion is large and the vitality of the organism enfeebled, the leucocytes are insufficient to cope with them, and disastrous effects follow.

It is not my purpose to treat of derangements in the pelvic viscera disconnected with ileo-cæcal affections, yet the consequences of inflammatory action extending to other parts, and the effects of perforation inducing peritonitis, with the suppuration involving adjacent tissues, owing to structural changes in this portion of the intestinal canal, belong to our inquiry. The results of operative proceedings in general peritonitis under the new regimé encourages a resort to laparotomy under circumstances which

formerly would have been considered as contra-indicating such a measure of treatment, and this is the most striking outgrowth of antiseptic surgery which recent investigation has developed. That the very condition of the abdominal contents which previously proved a barrier to incising its walls, should now present a sufficient reason for laparotomy with a view to its proper treatment, is a grand revolution in abdominal surgery. Not only in peritonitis following perforation, but in that from general morbific impressions, laparotomy is warranted by the record of cases in which relief has been thus secured.

There are cases of recovery or death reported in which accurate diagnosis could not be made, and in which consequently no operation was undertaken or autopsy permitted. The statistics of obstruction being always doubtful without an exploratory incision, we cannot draw a satisfactory comparison between the supposed cases of invagination which are relieved by general treatment and those which are verified by the performance of laparotomy. But the number of cases in which the diagnosis has been confirmed by a detachment of some portion of the alimentary canal and its presence in the evacuations, may be compared with those fatal results in which invagination is recognized by autopsies, and it is very desirable that we should have accurate statements of all such cases, for the purpose of forming a table representing the percentage of mortality without laparotomy. These two proceedings have their advocates in British surgery, under the leadership respectively of Mr. Jonathan Hutchinson and Mr. Frederick Treves, the former holding to the treatment without operative interference and the latter supporting early resort to laparotomy.

An elaborate report of Prof. Heinrich Braun, of Jena, upon the operative treatment of invagination, presented to the German Medical Congress, April 8, 1885, gives a table of cases with results as follows:

Since 1870 out of sixty-one cases there have been fifty-one operations, eighteen of these cases having occurred in Germany and the remaining forty-three in other countries; of the whole, thirty have occurred in children and twenty-one in adults. In those operated upon eleven have been relieved while forty have terminated fatally. In twenty-seven of the cases disinvagination was effected and in twenty-four it was not; of the former eighteen were children and nine were adults. Four children survived while fourteen died. Seven adults lived while two succumbed.

Resection of the invaginated intestine was practiced in twelve cases, of which only one lived and the other eleven died, six being children and five adults. Enterotomy was performed in nine cases with death in all, there being three children and six adults. Enterotomy without disinvagination terminated fatally in ten cases, seven being adults and three children.

In eight of the sixty-one cases tumors existed and some of these were of a malignant nature. Of the cases in which the invaginated portion of the intestine was removed by resection, 42 per cent. died from peritonitis, perforation, or subsequent stenosis.

The inference drawn by Dr. Braun from the unfavorable results of those cases in which operative measures were delayed from a few to many days after the development of symptoms, is, that surgical operations should be resorted to promptly when the invagination is not relieved by simple measures. When the disinvagination is accomplished while the bowel maintains its vitality nothing further is indicated, but when gangrene has commenced, resection should be resorted to, provided the general strength of the patient favors it. But in cases of marked prostration, accompanied with meteorism, it is advisable to form an artificial anus, as the most speedy means of relief.

In the discussion upon Dr. Braun's paper, it ap-

pears that in German practice the early stage of all abdominal disorders is relegated to the physician's management, and it is only when operative interference is demanded that the patient comes under the surgeon's care, so that the case is usually of a grave order before surgical measures are adopted. Even washing out of the stomach and enemata of various components, with inversion of the body, massage, etc., and internal medication or subcutaneous injections, are resorted to by the physician sometimes for days in succession before turning over the patient to a surgeon. There is no greater mistake in regard to the province of surgery, than to consider this sphere of duty as limited to instrumental appliances, and it should be understood that the highest and noblest achievement of the surgeon is to cure when it may be practicable without the knife, or in cases requiring it, to prepare his patient properly for an operation. Thirty-two of the cases reported involved the ileo-cæcal connection, and of these only three survived, being less than 10 per cent. of cures by operative measures in this class of invaginations.

In a table of resections of the intestine for malignant growth, accompanying a paper of Dr. Robert F. Weiss, presented to the New York Surgical Society, January 26, 1886, seven out of the thirty-five cases given were located in the ileo-cæcal structures. Four of these cases survived the operation of resection, and in another the result is not stated, but probably recovered from the operation, thus affording 71$\frac{3}{7}$ per cent. that escaped death from resection of the ileo-cæcal connections involved in malignant disease. The fact of recurrence in most of the cases at a longer or shorter interval does not materially affect the consideration of the propriety of such a measure; and yet there is an important lesson to be learned from the greater tolerance of the operative procedure in this chronic disorder of the tissues than in that acute inflammation connected with invagination.

A recognition of this pathological modification is essential for a proper comprehension of the surgical relations of the ileo-cæcal region and for a due appreciation of the different stages in the inflammatory processes affecting the various structures entering into this complex organism, at which separate steps may be taken for their relief. We have to encounter with surgical appliances the incipient hyperæmia or engorgement of tissues, the progressive changes of the inflammatory process, the suppurative degeneration and structural disintegration of acute developments; while on the other hand we must be prepared to combat the slower progress of fibrinous depositions, indurations, and accretions of material due to chronic disease, involving the elements which enter into the different tissues composing these organs. Again, the surgeon has to deal with those adventitious growths connected with malignant disease, which is very prone to manifest itself in the ileo-cæcal region; and each calls for a distinct mode of surgical treatment.

The operative procedures indicated by ileo-cæcal disorders are extra- or intra-peritoneal; the former consisting in exploratory punctures through the tissues in the inguinal or lumbar regions, and subsequent incisions to evacuate purulent collections; and the latter in laying open the abdominal wall for the purpose of correcting the abnormal relation of parts in the ileo-cæcal region. At the earliest period that pus may be detected in the iliac tumors deep incisions have been attended with satisfactory results for the relief of fæcal abscesses. With the lights of experience as to the serious consequences of delay in obstruction of the intestinal canal from any cause on either side of the ileo-cæcal connection, it is warrantable to resort to laparotomy as soon as the symptoms indicate occlusion from other sources than fæcal impaction, without waiting to make a differential diagnosis, or delaying to test the effect of temporizing

measures of treatment. The division of constricting bands, the unfolding of twists in the intestinal canal, the release of the invagination of one portion of the tube in another, the excision of gangrene or diseased segments and reunion by sutures, are demanded in various cases.

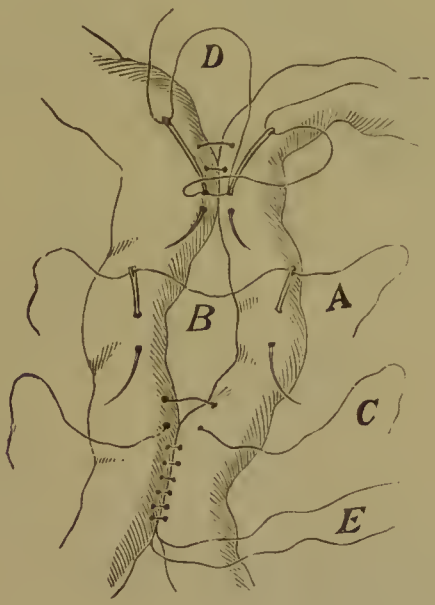

FIGURE 1.—A shows the insertion of needles for first stitch in intestinal walls. B represents the placing of initial loop. C displays the thread ready for closing. D gives the progressive stitching of walls in the opposite margins. E indicates the completion and knotting of threads.

Stenosis from fibrous depositions or malignant growths in the vicinity of the ileo-cæcal connection would seem to warrant the removal of the entire structure involved. But a grave question is presented as to the practicability of such a resection of this portion of the intestinal canal, and restoration of its tract, without a fatal result in acute cases. My ex-

periments upon dogs by entire removal of the ileo-cæcal connection, and uniting the ileum with the colon, has caused death promptly in each case, apparently from the effects of shock, and it is doubtful whether favorable results can attend this operation on the human subject—the successful case of Czerny being incomplete resection, cannot be accepted as recommending excision in acute cases. The practicability of relief in this class of cases by effecting a direct communication between the ileum and colon, so as to cut off the passage through the ileo-cæcal valve, is worthy of consideration. This may be accomplished by uniting their walls with the Gely suture in an oval or circular form. so as to strangulate the enclosed segment, and thus cause an opening, while the outer surfaces become agglutinated, thus effecting union with immediate passage of the intestinal contents. The diseased structures become atrophied or may be excised subsequently. If it should be desirable to effect an immediate passage from the ileum into the colon, with a view to accomplish the resection of the diseased structures on the same occasion, there could be no difficulty in proceeding upon the same principle as indicated by my punch process for the communication of the gall-bladder and duodenum (in the article on "Duodeno-Cholecystostomy," which appeared recently in the second volume of the "Reference Handbook of the Medical Sciences").

The application of this suture is made equally well in the continuity of the intestinal walls or after removal of a segment from each through a doubling of their coats, and effects from without the canal what is proposed by Bishop's suture from within. A single thread having a needle attached at each extremity is passed by the respective needles through the two several approximated walls of the large and small intestine, making a stitch of corresponding length through the whole of the tissues; and then by pass-

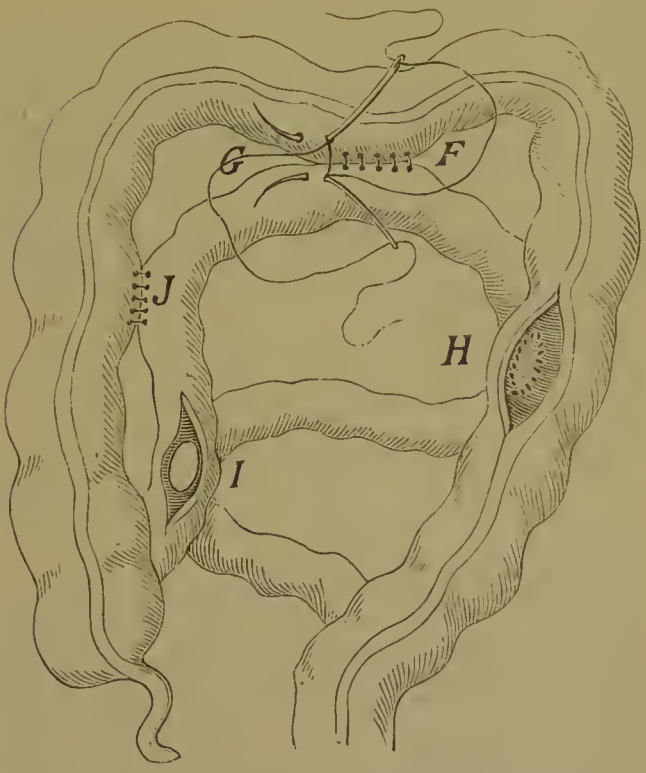

FIGURE 2.—F exhibits the attachment of the exterior surface of intestinal walls. G, needles entered for last stitch in the united coats of the large and small intestines. H is a view of the stitches in mucous membrane through the incision of colon. I is the opening seen by making an incision in the walls of the ileum after separation of segment of both coats. J represents the consolidation of exterior surfaces around the communication between the canals.

NOTE.—The oval white spot in opening at I is due to an error in the drawing.

ing across so as to penetrate on opposite sides at the point of exit, other stitches are made, which draw the exterior serous coats in close apposition. Quite recently I have met with a strong confirmation of the indications for the process of mediate communication in the statement of Mr. T. B. Jessett, in his

lectures at the Cancer Hospital in London, as follows: "When the obstruction is caused by the projection of a cancer into the gut the calibre of the tube may be restored by the breaking down and sloughing of the mass; or the disease extending, adhesive inflammation may take place between it and the adjacent portion of the intestine; ulceration taking place between the two portions, and an opening established, whereby the passage of fæces may occur from the portion of the intestine above the disease to another portion below it."

We may imitate nature in her effort to obviate the difficulty of constriction in the natural course of adhesions and a fistulous communication directly, by adopting the measure for uniting the coats of the intestinal canal above and below the point of stricture, and thus establishing a direct route for the passage of the contents of the alimentary canal by cutting off the obstructed coil of intestine.

The practicability of this procedure is shown in the operation of gastro-enterostomy, which consists in forming a fistulous opening between the stomach and jejunum, as originally suggested by Wölffler. It has been proposed by Billroth to remove the pylorus subsequently, and stitch up the cut ends, thus turning the food entirely through the artificial opening; and a similar operation of a secondary nature would be available for the removal of the ileo-cæcal connection involved in disease. So soon as the direct artificial communication between the ileum and colon is fully established through the opening made by separation of the tissues included in a circular or oval row of stitches, the cessation of the passage through the ileo-cæcal valve must lead to a gradual atrophy of the structures adjoining on either side, and in case of simple stenosis, obliteration of the canal will ensue, while if carcinoma exists, there will be such a diminution of vitality in the healthy attachments as to lessen materially their susceptibility to shock or

inflammatory action, so as to admit of the requisite operation for removal of resection and suturing for closure of the divided ends.

A thorough investigation of the morbid conditions of the ileo-cæcal region leads to the following conclusions:

1. That certain modifications are corrected spontaneously, or by the process of resolution under treatment.

2. In the early stage of ileo-cæcal disorders, medicinal or mechanical measures are advantageous.

3. That extra-peritoneal punctures and incisions are beneficial in cæcal inflammation, with or without fæcal abscess.

4. Disorders involving the peritoneum, when not promptly relieved by general treatment, warrant exploratory opening of abdomen.

5. Impediments of the intestinal canal or morbid accumulations in the abdominal cavity, accompanied by meteorism, call for immediate surgical interference, with laparotomy.

6. In case of simple stenosis or malignant growths involving the ileo-cæcal connections, ileo-colostomy is indicated.

7. Gangrenous portions of the intestinal canal necessitate resection, and either direct restoration by suturing the ends or the formation temporarily of an artificial anus.

8. Operative measures in the ileo-cæcal derangements should not be delayed until the physical powers have become prostrated, but resorted to while there is capacity for reaction of the vital forces.

NOTE.—Operations of Maisonneuve, Langier and Hacker require my process.